

### **REMARKS**

Claims 1, 3-9 and 11-19 are now pending in the application. Claims 2 and 10 are cancelled. Claims 1 and 16 are currently amended. Support for these amendments may be found throughout the specification as originally filed. Claims 12-15 and 19 have been withdrawn. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

### **INTERVIEW SUMMARY**

Applicant thanks the Examiner for the telephonic interview of June 13, 2006. Therein, participants, including Examiner J. B. Strege and Applicant's Attorney of Record Jennifer S. Brooks, discussed the amendments to the claims contained herein. In particular, the Examiner suggested that Applicants' remarks are on the right track, and also amendments to Claim 1 and 16 were discussed to clarify the term "top" in the claim limitation phrase "a top predetermined rate".

### **REJECTION UNDER 35 U.S.C. § 112**

Claims 1 and 16 stand rejected under 35 U.S.C. § 112, second paragraph, as there being insufficient antecedent basis for the limitation "the top predetermined rate." This rejection is respectfully traversed.

Applicants have amended Claims 1 and 16 to clarify the limitation and therefore render this rejection moot.

**REJECTION UNDER 35 U.S.C. § 103**

Claims 1, 3-4, 6 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kado et al. (U.S. Pat. No. 5,995,639, hereinafter "Kado") in view of Poggio et al. (U.S. Pat. No. 5,642,431, hereinafter "Poggio") in view of Mizutani et al. (U.S. Pat. No. 5,844,565, hereinafter "Mizutani") and further in view of the Applicant's admitted prior art (hereinafter "AAPA"). Claims 7-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kado et al. in view of Poggio et al, in view of the AAPA, and further in view of Chen et al. (U.S. Pat. No. 6,792,134). Claims 11, 5 and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kado et al. in view of Poggio et al, in view of Mizutani, in view of AAPA, and further in view of Odaka et al. (U.S. Pat. No. 6,035,054). Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kado et al. in view of Poggio et al., in view of Mizutani et al., in view of the AAPA, and further in view of Eriksson *Eye-tracking for Detection of Driver Fatigue* (as cited in the IDS). These rejections are respectfully traversed.

The Examiner states that the disclosure in Mizutani states that "the results of the sobel filtering are limited to the range of permissible luminance values" corresponds to the feature of the claimed invention, generating an expression for conversion for histogram equalization using pixels in the part having a brightness gradient intensity falling within a top predetermined rate. However, Applicants believe that this recognition by the Examiner is improper. Mizutani does not disclose anything about generating "an expression for conversion for histogram equalization" and fails to refer to "pixels in the part having a brightness gradient intensity falling within a top predetermined rate". Applicants also

suppose that the process of “limiting the results of the sobel filtering to the range of permissible luminance values” has no relation to generating “an expression for conversion for histogram equalization”.

In Mizutani, as disclosed in col. 8, lines 40-67 and col. 9, lines 1-9 and 57-67, in Sobel filtering, weighted differentials in the horizontal and vertical directions are computed (77, 79 in Fig. 13), the absolute values of these differentials are summed (81 in Fig. 13) and the result is limited to the range of permissible luminance values (83 in Fig. 13). After filtering, histogram equalization is performed by performing a logarithmic function on the luminance values (the range-limited Sobel filtering result) (76 in Fig. 12). This process increases small Sobel-filter result values (luminance values) to larger values (for example, histogram shown in Fig. 16A is converted into Fig. 16B). Also, by combining the first buffer including this Sobel filtering result with the second buffer including the original image (78 in Fig. 12), the contrast of the original image is emphasized.

Here, histogram equalization in Mizutani merely “increases the number of pixels in the mid-range of luminance value” (col. 9, lines 65-66) by making small Sobel-filter result value larger using the logarithmic function. Accordingly, Mizutani fails to generate “an expression for conversion for histogram equalization” using “pixels in the part having a brightness gradient intensity falling within a top predetermined rate”.

On the other hand, according to the claimed invention, “an expression for conversion for histogram equalization” is generated using “pixels in the part having a brightness gradient intensity falling within a top predetermined rate”. Thus, the contrast at

the edge portion of the eye can be efficiently improved (page 23, line 22 – page 24, line 8 in the specification).

The histogram equalization is the process of uniformizing frequent distribution (histogram) with regard to the luminance, as is well known. Specifically, in the original image, the luminance values with large frequency are contrast-emphasized while the luminance values with small frequency are contrast-reduced. In case that the ordinary histogram equalization is applied to the face image, the luminance values in skin portion are contrast-emphasized while the luminance values in eye portion are contrast-reduced because the skin portion is much larger than the eye portion in the face image.

According to the claimed invention, brightness gradient is calculated for the face image, and using “pixels in the part having a brightness gradient intensity falling within a top predetermined rate”, “an expression for conversion for histogram equalization” is generated. “Pixels in the part having a brightness gradient intensity falling within a top predetermined rate” include a large number of pixels corresponding to an edge portion of the eye, rather than the skin portion. As a result, the contrast at the edge portion of the eye can be efficiently improved.

In contrast, Mizutani, pixels having a small brightness gradient are contrast-emphasized. Speaking of the face image, the luminance values in the skin portion, which have a smooth brightness gradient, are supposed to be contrast-emphasized. Accordingly, it is impossible to improve efficiently the contrast at the edge portion of the eye. In addition, the luminance values in the eye portion, which have a larger brightness

gradient than the skin portion, may be contrast-reduced. Therefore, Applicants believe that Mizutani is not suitable for detecting the eye position, the object of the claimed invention.

**CONCLUSION**

In view of the above amendment, applicant believes the pending application is in condition for allowance. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 08-0750, under Order No. 5077-000079/US from which the undersigned is authorized to draw.

Dated: July 7, 2006

Respectfully submitted,

By 

Gregory A. Stobbs

Registration No.: 28,764

HARNESS, DICKEY & PIERCE, P.L.C.

P.O. Box 828

Bloomfield Hills, Michigan 48303

(248) 641-1214

Attorney for Applicant